

### DISCUSSION OF THE AMENDMENT

All of the pending claims have been cancelled and replaced with new Claims 32-51, which claims are generally supported by the specification as a whole and the original claims.

No new matter is believed to have been added by the above amendment. Claims 32-51 are now pending in the application.

### REMARKS

As recited in new Claim 32, the present invention is a surface treatment apparatus comprising:

a plasma generation section for generating plasma from a plasma generating gas,  
a treatment vessel connected to the plasma generation section and including a  
susceptor on which a subject to be treated is placed;

a cooling device for cooling the subject placed on the susceptor to a predetermined temperature, and

a supply section for adding a reactive gas to an activated plasma generating gas  
activated by the plasma generation section and caused to flow toward the subject cooled by  
the cooling device,

wherein an activated reactive gas is generated by adding the reactive gas to the  
activated plasma generating gas, and the activated reactive gas is reacted with a surface layer  
of the subject cooled by the cooling device.

The rejection of Claims 1-9 under 35 U.S.C. § 103(a) as unpatentable over  
U.S. 5,403,434 (Moslehi), is respectfully traversed. Moslehi discloses a low temperature in-  
situ dry cleaning process for removing contaminants from the surface of a semiconductor  
wafer under fabrication using a mixture of digermane and hydrogen in a temperature range of

350°-750°C under vacuum or low pressure conditions (column 5, lines 5-20). However, Moslehi neither discloses nor suggests (a) a supply section for adding a reactive gas to an activated plasma generating gas activated by a plasma generation section and caused to flow toward a subject cooled by a cooler, nor (b) the activated reactive gas reacted with a surface layer of the subject cooled by the cooler, as required by all the present claims. Nor does Moslehi disclose or suggest that when the above features (a) and (b) are present, the reaction between the activated reactive gas and the surface layer of the subject to be treated is promoted. With these features, the present invention exhibits a special operation effect that the reaction between the activated reactive gas and the surface layer of the subject to be treated is promoted, as compared to the conventional case where the subject to be treated is not cooled.

For all the above reasons, it is respectfully requested that this rejection be withdrawn.

The rejection of Claims 18, 23-25, and 28-31 under 35 U.S.C. § 103(a) as unpatentable over Moslehi in view of U.S. 5,616,208 (Lee), is respectfully traversed.<sup>1</sup> The disclosure and deficiencies of Moslehi have been discussed above. Lee does not remedy these deficiencies. Lee is drawn to cleaning a multi-chamber vacuum processing apparatus using a cleaning gas containing  $\text{ClF}_3$ . The Examiner relies on Lee's disclosure of, *inter alia*, a cooling means and concludes that it would have been obvious to employ the cooling means of Lee in the apparatus of Moslehi in that "it could be used for processing different steps." In reply, there is simply no motivation to include a cooling means in Moslehi. Nevertheless, even if a cooling means were added to the apparatus of Moslehi, the result would still not be the presently-claimed invention because, as discussed above, all of the present claims require

---

<sup>1</sup>Applicants query the absence of Claim 16 from the statement of the rejection, given that the listed claims depend or ultimately depend on Claim 16, and are thus narrower in scope.

a supply section for adding a reactive gas to an activated plasma generating gas activated by the plasma generation section and caused to flow toward the subject cooled by the cooler, and the activated reactive gas is reacted with the surface layer of the subject cooled by the cooler, neither disclosed nor suggested by the combination of Moslehi and Lee.

Accordingly, it is respectfully requested that this rejection be withdrawn.

The rejection of Claims 16, 17, 19-22, 26 and 27 under 35 U.S.C. § 103(a) as unpatentable over U.S. 5,681,780 (Mihara et al) in view of Lee, is respectfully traversed. Mihara et al is drawn to a method of manufacturing a semiconductor device involving the steps of forming an insulating film on a silicon substrate, forming a resist pattern on the insulating film, etching the insulating film with a fluorocarbon containing gas by using the resist pattern as an etching mask to expose the surface of the silicon substrate, and performing an ashing and etching process in a single down-flow process chamber with a gas containing O<sub>2</sub> and CF<sub>4</sub>, while heating the silicon substrate to about 40°C or higher at least at an initial period of the ashing and etching process for ashing the resist pattern and etching a surface layer at the exposed surface of the silicon substrate at the same time. See Claim 1 therein. The disclosure and deficiencies of Lee have been discussed above. The Examiner holds that it would have been obvious to substitute the heating means in Mihara et al with heating lamps arranged above a wafer to be treated as disclosed in Lee. However, even if the findings of what Mihara et al and Lee disclose were correct, and even if one skilled in the art were to combine these references, the result would still not be the presently-claimed invention. As discussed above, all the present claims require (a) a supply section for adding a reactive gas to an activated plasma generating gas activated by the plasma generation section and caused to flow toward the subject cooled by the cooler, and (b) the activated reactive gas is reacted with a surface layer of the subject cooled by the cooler, neither

disclosed nor suggested by Mihara et al and/or Lee. Nor do these references disclose or suggest the benefits obtained from the above features (a) and (b), as discussed above.

For all the above reasons, it is respectfully requested that this rejection be withdrawn.

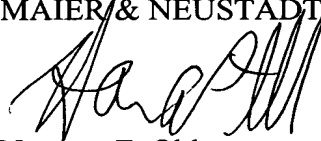
The rejection of Claims 23-25 and 28-31 under 35 U.S.C. § 112, second paragraph, is respectfully traversed. Indeed, the rejection is now moot in view of the above-discussed amendment. Accordingly, it is respectfully requested that it be withdrawn.

Applicants note that for the Form PTO 1449 included with the IDS filed February 5, 2001, the Examiner has crossed out reference "AW" and written in a reference under "AS", which appears to be intended as the same prior art reference, but stated differently. Applicants note, however, that under "country", the Examiner has written in "EPO", presumably because the furnished patent abstract of Japan contains the heading "European Patent Office". However, the document number refers to a **Japan** patent publication, not an EPO patent publication. The Examiner is thus requested to correct the initialed Form PTO 1449 by replacing "EPO" with --Japan (with English abstract)--, and include a copy of the corrected form with the next Office communication.

All of the presently pending claims in this application are now believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.



Norman F. Oblon  
Attorney of Record  
Registration No. 24,618

Harris A. Pitlick  
Registration No. 38,779



**22850**

(703) 413-3000  
Fax #: (703) 413-2220  
NFO:HAP:cja

I:\atty\HAP\200669US-am.wpd

200669US-0 DIV



**Marked-Up Copy**

Serial No:

09/736,147

Amendment Filed on:

HEREWITH

IN THE CLAIMS

--1-31. (Cancelled).

--32-51. (New).--

B